1: Gifford E-4,5 (1920-1921) 1929 OU9 Tonga OU9

fect. As it was more common among the aged than the young, some of us were of opinion that it was occasioned by the death of their parents, or some other near relation. But Mr. Wales one day met with a man, whose hands were both perfect, of such an advanced age, that it was hardly possible his parents could be living. They also burn or make incisions in their cheeks, near the cheek bone. The reason of this was equally unknown to us.

Wilson (66, pp. lii, liii) and Mariner (41, vol. 2, p. 210) describe well the process of finger sacrifice and tell of children competing for the privilege of sacrificing for some sick relative.

The sacrifice of human beings was resorted to on the following occasions: (1) Sometimes to secure the recovery of a great chief from illness, (2) following the death of a great chief when his widows might be strangled, or anciently perhaps burned alive, (3) at the funeral of a great chief, when the undertaker and (or) certain commoners would be imprisoned in the great stone burial vault, and left there to die, (4) at the dedication of certain temples, (5) perhaps on the occasion of the launching of certain great double vessels. The carving of living victims appears not to have been in the nature of a sacrifice (26, pp. 34, 192).

Sacrifices to the gods to secure the recovery of a great chief often consisted of one or more of the chief's own children by women of inferior rank. Children of low rank who were liable to be sacrificed were called *tuputalinafi*. A sacrifice for the recovery of the Tui Kanokupolu Mumui is described by Wilson (66, pp. 238, 239). Mariner (41, vol. 2, p. 208) describes others. A sacrifice was made for the old chief Fatu of Tongatabu, father of Tungi I. Fatu was very ill, and his sister's son Tavake (Fatu's *fahu*) ordered that his own son be strangled as an offering. The strangling did not take place in the sick man's house but outdoors. The victim with his two executioners was covered with a huge piece of tapa. When the strangling cord had done its work the trio were uncovered and the corpse of the victim carried into the house of the god Pulotu Katoa. The sacrifice was of no avail, for the god, speaking through his shaking priest, predicted Fatu's death, which shortly occurred. According to Cook (19, vol. 1, p. 410) a man destined for sacrifice was called *tangata tapu*.

The strangling of widows of great chiefs which was the custom at the end of the eighteenth century, may have been due to Fijian influence (41, vol. 2, p. 209; 66, p. 240). Some evidence that burning alive was an earlier method appears in Samoan tales dealing with Tonga (36, vol. 1, pp. 94, 344). Whether this custom can be connected with the suttee of India, I cannot say, but it seems quite possible that the burning may have been a cultural feature brought from the continent and later supplanted by the strangling cord of Fiji; or possibly strangling may be traced westward through Micronesia and connected with the custom in ancient Japan. Hearn (29, p. 314)

1: Gifford E-4,5 (1920-1921) 1929 OU9 Tonga OU9

would choose a friend of his own to superintend operations on the end of the rope by which the stone slab was lowered into place, and his saying to this friend, "Pulu hoo tuku kau moui," was a request to let down gently in order to give him a chance of life. The name of an undertaker Mailau is preserved as having been so shut in a vault. In the ceremonies following burial the matapule of the chief, either successor to the dead man, or the head of the family before, sat on the chief's right hand and the undertaker sat on his left. On this occasion, since Mailau was in the vault and unable to take his position and perform his duties on the left of the chief, someone went each morning and called to him the work that had been done, and enumerated the ovens of food that had been presented. For eight days the unfortunate man in the vault called out the appropriate thanks, but on the ninth morning there was no response from below, and presuming that Mailau was dead, the chief proceeded to the appointment of his successor.

Burial alive of a victim beneath a house post may have been an occasional practice in Tonga. One instance only came to light and that in connection with the erection of the Falemee, which was a temple, presumably to Hikuleo, on the island of Haano, Haapai. Dr. S. W. Baker in a lecture given on November 2, 1866, made the following statement about it:

> I have stood in the old Fale Mee at Haano, which is the last *fale otua* (temple of their god) still standing in Haapai. At the foot of the principal post there is buried a man, who was said to be the best singer in all Tonga. He was offered a living sacrifice to the god at the building of the temple, as an act of dedication.

The launching of great vessels over the bodies of commoners was asserted by the chief Ata in reply to a leading question. He said that he had heard such a tale from the chief Fulivai of Vavau. The information was volunteered by another informant that a chief once killed one or two men who were aiding in the launching of a great vessel, in order to stimulate the remaining men to greater effort. Takai, the one-eyed chief of Pea, Tongatabu, on one occasion killed the first man of a crew that was tugging half-heartedly on the ropes by which a great stone slab was being moved from the weather shore to Pea.

One informant told of the title Tupou Angataha which was an office dedicated to sacrifice:

> A Tupou Angataha had proven a traitor in war to the Tui Tonga Laufilitonga [probably before his appointment]. As a punishment Laufilitonga ordained that a Tupou Angataha should die every other day. The duty of selecting each new appointee was placed in the hands of Tupou Vakehekehe, a chief of the Haa Ngata. Each new Tupou Angataha was proclaimed by the matapule at the kava circle of Laufilitonga. The Tupou Angataha appointed one day was executed the next day by the club or the strangling cord. How many victims were thus appointed and executed was not known. The last appointee fled from Tongatabu to Haapai and not only escaped execution himself, but put an end to the series.

1: Gifford E-4,5 (1920-1921) 1929 OU9 Tonga OU9

For an inferior person (petty chief, matapule, or commoner) to walk by a chief's house smoking is an affront; also riding horseback, carrying an umbrella, wearing a turban (*fau*), or having a garland (*sisi*) around the neck, although a *sisi* around the waist is permitted. Conversation must stop in passing a chief's house. Breaches are subject to punishment by thrashing, often by the chief himself. The conception of a supernatural punishment seems not to be entertained.

The Hihifo district of Tongatabu is tapu. No one is allowed to sing or to yell, either in settlements or in the bush. Drums may not be beaten. People must not run about in the town, and all must wear ragged mats (*taovala*) as signs of humility. These rules are enforced because of the Tui Kanokupolu and are observed in Hihifo whether the Tui Kanokupolu is in Hihifo or in Nukualofa. Again no supernatural punishment followed a breach of these rules.

OCCUPATIONAL CEREMONIAL

Christianity has been too long established is Tonga to permit of much information being obtained to-day concerning religious practices for the furtherance of various occupations. Apparently the greatest of all ceremonials of this character was the *inasi*, or Harvest Festival, which obviously had as its aim the perpetuation of agricultural welfare. It was in honor of Hikuleo, but the offerings were brought to the Tui Tonga, whom Farmer (23, p. 129) says was the high priest of this deity, a statement which cannot be verified to-day. Cook (19, p. 336) witnessed an *inasi* ceremony at which the Tui Tonga presided. The *inasi* is also described by Wilson (65, 66) and by Mariner (40,41).

Boat building, fishing, pigeon snaring, and presumably even rat shooting were preceded by ceremonial observances, but what these ceremonies were I did not learn except in the most casual way, as the following fragmentary notes indicate. Bishop Blanc (39, pp. 59, 60) describes observances in connection with shark fishing.

Just what ceremonies were performed at the launching of a vessel I did not learn. Before a new vessel could be boarded by a woman, however, a ceremony called *kopokivaka* was performed. This took place at or after the launching and was usually performed by a woman, though sometimes by a man.

The first shark caught in a new fishing boat (*tafaanga*) is called *tokialiu*. A celebration in honor of this event bears the same name. When five sharks have been caught in a *tafaanga* another ceremony occurs, called *fakatoululoto*. When ten sharks have been caught in a *tafaanga*, a third ceremony takes place, called *fakatouluhoko*. Thereafter sharks may be caught without further ado.

In pigeon snaring a man stood on the lookout for the pigeons at the mound. At their first appearance in the distance, looking only as big as the *nono* (defined by Baker as an insect and by the informant Havili as an insect smaller than an ant), dances

3: Mariner F-5 (1806-1810) 1818
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the chief to whom they are attached. They have the management of all ceremonies. Their rank is from inheritance; and they are supposed to have been, originally, distant relations of the nobles, or to have descended from persons eminent for experience and wisdom, and whose acquaintance and friendship on that account became valuable to the king, and other great chiefs. As no son of a mataboole can assume that rank and title till his father be dead, the greater part of them are beyond the middle age of life, and, as it is their business to make themselves acquainted with all rites and ceremonies, and with the manners, customs, and affairs of Tonga, they are always looked up to as men of experience and superior information*. Some of the matabooles are adepts also at some art or profession, such as canoe-building, or superintending funeral rites: this last, though a ceremony, the generality of matabooles do not attend, as it is also a distinct profession. Those few that are canoe-builders are very perfect in their art, and only make canoes for the king, or other great chiefs. The matabooles

* The rank and office of the matabooles must be a very great advantage to the Tonga people: it may be presumed to be one great cause of the superiority of this nation over the inhabitants of the Fiji islands, the Society islands, the Sandwich islands, &c.

3: Mariner F-5 (1806-1810) 1818
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555 ingenious, and therefore respectable; and hence
461 they have no motive sufficiently strong (unless
[431] it be sometimes laziness) to engage them to relinquish it, particularly as they obtain presents from their chiefs for their ingenuity. There is no positive law to oblige them to follow the business of their fathers, nor any motive but the honourable estimation in which their arts are held, or their own interest, or the common custom.

555 None of them are matabooles but a few of
461 the canoe builders and the superintendants of
565 funeral rites, perhaps about a fifth or a sixth
396 part of them, and some of these are very ex-
767 pert in cutting ornaments out of whales teeth
[306] for necklaces, or for inlaying clubs, likewise in
[719] making clubs and spears, and other warlike instruments, which are not separate professions, but arts practised by the canoe builders as being expert in the use of the togi or axe; at least there are no *toofoonga fono le* (inlayers of ivory), nor *toofoonga gnahi mea tow* (makers of warlike instruments), but who are also canoe builders. All the *toofoonga fo vaca* (canoe builders), and *toofoonga taboo* (intendants of funeral rites), that are not matabooles are mooas, for no person of so low a rank as a *tooa* can practise such respectable arts.

000 The remaining professions are followed both

3: Mariner F-5 (1806-1810) 1818
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Hereditary.	*Toofwonga fo vdca*; canoe-builders.	Followed both by *matabooles* and *mooas*.	555
	Toofoonga fono le; cutters of whale-teeth ornaments.		461
	Toofoonga taboo; superintendants of funeral rites.		565
	Toofoonga ta maca; stone-masons, or makers of stone vaults.	Followed both by *mooas* and *twous*.	[396]
	Toofoonga jia cobenga; net-makers.		[306]
	Toofoonga toty ica; fishermen.		767
	Toofoonga langafalle; large house-builders.		324
Hereditary or not.	*Toofwonga ta tattow*; those who perform the tattow.		286
	Toofoonga tongi acow; club-carvers.		[226]
	Toofoonga fy cava; barbers or shavers with shells.	Followed only by *tooas*.	[331]
Hereditary.	*Tangata fe oomoo*; cooks.		[305]
	Kyfonnoa; peasants.		[322]
			[306]
			252
			[241]

Property in these islands, as may easily be conjectured, consists principally in plantations, houses, and canoes, and the right of succession to it is regulated by the order of relationship, as given under the head of Nobles, p. 83, so in like manner is the right of succession to the throne. 421 428

Having now given a view of the rank of individuals in society, with reference to religion, civil government, and professional occupations; we have now to consider it in respect to old age, sex, and childhood. 128

Old persons of both sexes are highly reve- 888

3: Mariner F-5 (1806-1810) 1818
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fortifications; making ropes, bows and arrows, clubs and spears, which are practised by men, whilst the manufacture of *gnatoo*, mats, baskets, thread, combs, &c., constitute the occasional employment of the women, even of those of rank. We shall give an account of each of the principal arts, beginning with those that are strictly professional.

Fo VACA, canoe-building. As it would be impossible to give an intelligible and accurate description of this ingenious and useful art, without referring to well-executed plates, and as this has been already so ably done in Cook's and d'Entrecasteaux's voyages, we presume it would be but an unnecessary intrusion upon the attention of the reader to attempt entering into such a description. It may here be noticed, however, that the Tonga people have obtained a considerable share of information in the art of building and rigging canoes, from the natives of the Fiji islands. It has already been observed, that, in all probability, the communication between these two nations, at the distance of one hundred and twenty leagues, began on the part of the Tonga people, who being situated to windward, it is very likely that one or more of their canoes were formerly drifted to the Fiji islands by stress of weather; and although they have no tradition of such a cir-

3: Mariner F-5 (1806-1810) 1818
OU9 Tonga OU9

to sea, and returned to the Fiji islands to lay in a second cargo.

The Fiji islanders make their canoes principally of a hard firm wood, called *fehi*, which is not liable to become worm-eaten; and as the Tonga islands do not produce this wood, the natives are not able to build canoes so large or so strong as those of their instructors: all their large canoes, therefore, are either purchased or taken by force from the natives of Fiji. The natives of Tonga take the greatest pains with their canoes, polishing them with pumice-stone, and paying every attention that they are not more exposed to the weather than is absolutely necessary. The canoes of the Navigator's islands are similar to those which were formerly in use at Tonga, but the natives of those islands never venture to the latter place but in canoes manned with Tonga people.

Fono le, carving ornaments out of whales teeth, for the neck, and inlaying clubs, &c. with the same material. This art, as far as it regards ornaments for the neck, is of Fiji origin; but inlaying clubs, wooden pillows, &c. is their own invention. An account of the ornaments for the neck has already been given, (Vol. I. p. 299.) They inlay their clubs with extraordinary neatness, considering the rude tool they employ, which is generally a *togi* (or small adze), made out of an European chisel, a piece of an old saw,

3: Mariner F-5 (1806-1810) 1818
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of the nut, and have rather the appearance of wicker-work: the latter are sometimes variously stained and ornamented with beads or shells worked in. The larger and coarser baskets are generally made by men, to hold axes and other tools in: also the baskets used to hold victuals, made of the leaves of the cocoa-nut tree, are generally made by men.

Bawlá, mats for thatching houses, are either made by men or women, but more frequently by the former.

Most of these mats, baskets, &c. are made by women of some rank as an amusing as well as profitable occupation, exchanging them afterwards for other things: (See p. 95 of this volume). Making of combs, the teeth of which consist of the mid-rib of the cocoa-nut leaf, is also an employment of women of rank. Making thread is an occupation of females of the lower order: it is performed by twisting the separate parts of the thread, in the act of rolling them with the palm of the hand along the thigh, and by a return of the hand, twisting them together the contrary way. The material of the thread is the prepared bark of the *olongá*. Needles are generally made by carpenters out of human thigh bones, which are procured from their enemies slain in battle: the only use they have for them is to make sails.

7: McKern A-4,5 (1920-1921) 1929 0U9 Tonga 0U9

experimentation preceding the first appearance of surface stonework. But granting this possibility, it is hard to believe that the art of stone mortising, exemplified in both the Haamonga and the stone house beams on Heketa, could have been so fully developed without previous trials. Also a simple type of terracing might be expected as the first example of surface stonework rather than the comparatively elaborate three-terraced structure represented in langi Heketa. 172 333

The leap from other Mua langis to Paepaeotelea is not so abrupt as first appearances might suggest. Many of the Mua langis show bits of detail, such as smooth surfacing, the use of large thick stones, and close stone fitting, that are only slightly improved upon in Telea's langi, but where these features occur as occasional and scattered bits of detail in the other structures, this one langi shows a combined and uniform adoption of them all, and at their best. 172 764 333

The only new outstanding features in Paepaeotelea are: (a) the bevelling of the superior surfaces of the stone terraces, and (b) the use of L-shaped stones at the corners. It may be said that the solid stone nature of the terraces constitutes a third unique feature, but a careful survey of other langis shows a not infrequent tendency towards this. Such construction is patently impossible where stratified sedimentary rock is used as the building material. The numerous horizontal planes of natural cleavage present in such rock necessarily results in narrow slabs. But the tendency prevailed, as illustrated in all the large langis, to make these slabs as thick as possible, and in one langi a single stone has a width sufficient to extend more than half way across the width of a terrace. The use of nonstratified stone in Paepaeotelea made it possible to give the terrace walls any width desired, and the desired width would seem to have been the maximum width.

Likewise, it would be impossible to cut L-shaped cornerstones from the available stratified rock. On the other hand, experience must have taught the builders that L-corners are highly desirable as cleft corners have a tendency to spread under the weight of loose water-soaked soil and the outward pressure of large trees growing upon the structures. It was not entirely a new idea; its use in the construction of composite wooden boats (17) had undoubtedly long been in vogue. The use of nonstratified limestone made it possible to apply the well known principle to stone construction. 172 333 [396]

Bevelling was a decorative method well understood by boat builders. It is not strange that it should have been adopted sooner or later by stone masons. The use of L-shaped cornerstones made the pleasing effects of bevelling more prominent, and supplies a possible reason for its adoption on the occasion of erecting this particular structure. [396]

A discussion of the probability of an independent invention of the stone vault used in Tonga must wait for a fuller knowledge of stone vaults else- 172 764 171

21: Simkin U-5 (no date) 1945 OU9 Tonga OU9

from rich, but it is free from the hardships of real poverty, the poisons of economic inequality, and the degradations of a proletariat.

On the cultural side the void created by the collapse of the old religious beliefs has been more than filled by Christianity and the missions have been tender of other aspects of Tongan culture. The traditional music and handicrafts have all been encouraged along with a pride in the past. New interests have been provided by church choirs, stringed instruments and brass bands, and by the introduction of European sports like cricket. Education in English, history and geography has opened up new intellectual horizons, even if rather slowly and to too limited an extent.

Tonga's Future

If left alone to work out their future the Tongans can face it with hope and confidence. Much can be done to develop agriculture and to add new branches to it. Progress in this field holds out the hope, not only of better diet, larger real incomes, and a lessened dependence on foreign trade, but also the prospect of new vocational interests to enrich village and family life. Co-operative societies to spread agricultural knowledge, to market produce, and to operate equipment such as copra driers are already under way. New crops, animal husbandry and cotton weaving could all develop so as to give people more interesting lives as well as better standards of living. A new interest and activity is being shown in education, and real attempts are being made to develop it in the directions most needing reform. The new teachers' training college, in particular, should have valuable effects upon the quality of Tongan education, and should stimulate further educational reform.

These opportunities, however, will not be realised unless there is vigorous, imaginative and generous leadership. Tonga appears to be at a turning point—it can either move forward to a healthy nationhood or become a stagnant backwater of the Pacific. The dangers of such a decline cannot be ignored, even if they should not be exaggerated. The country's history reveals a great past, but the driving energy that made that past is not so very evident to-day. Boatbuilding and seamanship, which were once responsible for the subjection of central Polynesia, are now badly decayed. Other crafts still survive but can hardly be said to flourish. There are disturbing indications that the declining powers of the chiefs may lead to the passive acceptance of a

22: West M-3 (1846-1855) 1865 OU9 Tonga OU9

by the pressure of newly felt, and increasing necessities, arising from an extended intercourse with foreigners. But in the mean time these native prejudices must stand in the way of any scheme, of commercial enterprise, involving the employment of many hands.

In concluding our brief enumeration of the principal natural products of Tonga, it may be sufficient to say, that all the best islands contain trees which yield good timber for building purposes; but, both in variety and quantity, the supply is limited. The natives take no pains whatever to increase the stock of timber-yielding trees, in those localities that are adapted to their habits. There are, it is true, certain stringent regulations respecting the felling of timber; but there is at the same time an unnecessary and reckless waste of what nature herself affords. The best and largest trees are used in the construction of canoes. *Bobaos*, the smallest class of paddling canoes, are always cut out of single trees. *Tafaagas*, the beautiful and swift canoes that are employed in fishing for the bonito and albicore, and also the *hamatefuas*, or sailing canoes having only a single hull and large outrigger, are all built of planking, in the same style as the large *kalias*. These two classes of canoes, being required in considerable numbers, involve a great waste of valuable wood, inasmuch as only two, or, at most, three planks can be obtained, from a single tree, by the native method of cutting.

The *tamanu*; (*Calophyllum Burmanni*;) the *milo*; (*Thespesia populnea*;) the *futu*; (*Barringtonia speciosa*;) the *mohemohe*; the *fetau*; and the *tavahi*, are the trees from which good and durable

22: West M-3 (1846-1855) 1865 OU9 Tonga OU9

sea-shore presents quite a lively scene. Here some are sail-making, others spinning ropes, others plaiting *kafa*, or the cocoa fibre sinnet, and others again are employed in scouring or repairing the hulls of the various large sea-going canoes.

January 31st.—The Haabai portion of the king's Fijian fleet sailed for Tonga to-day. They have been waiting impatiently for several days for those that are coming from Vavau. The departure of so many large *kalias* was an imposing sight. Many tears, however, were shed by the friends of those who have gone; it being very probable that numbers of these voyagers will never return.

The subject of this expedition to Fiji, and of its results, requires a more extended and consecutive view of it than our journal would afford. It was the last event of moment that occurred during our remaining residence in the Friendly Islands; but inasmuch as the scene of Tonguese movements lay in Fiji, we must be pardoned for entering into certain details that have already appeared substantially in another work.* We also feel this to be very necessary, because in a still more recent publication of considerable note, some of the facts connected with the history have been misrepresented and distorted, to the manifest prejudice of the Tonguese people, and more particularly to the injury of King George.

In a work we have already named in former pages it is said, "that King George, the present ruler of Tonga, having subdued a rebellion in which Maafu, a leading Tonguese chief in Fiji, took part,

* "Fiji and the Fijians," vol. ii., pp. 189-196. London: Heylin. 1858.

501 [174] splendid design. Among the most daring Polynesian seamen were the Tongans, whose huge double canoes were called *kalia*.[A] Each of these double-hulled sailing vessels, stabilized by broad cross beams, supported a house-type shelter on its deck and was capable of carrying up to 200 people plus provisions. The *tongiaki*, another type of Tongan double canoe of smaller size, was used for local journeys.

[396] In the construction of the double canoes, the lack of nails was more than compensated for by the lashing with coconut fiber sennit, which was done with extraordinary precision and skill; in addition,

[P. 5-A]

A [See category 501, pp. vi and 2--Analyst]

39: Gerstle & Raitt C,Q-4,5 (1952-1972)
1974 OU9 Tonga OU9

501 the strong sails made from woven pandanus leaf
396 mats allowed the double canoes to be propelled at
[343] incredible speeds. For protection from the weather
[348] when not in use, or when being repaired between
trips, the grandiose double canoes of Tonga were
501 pulled ashore into large canoe huts.[A] Shorter,
484 inter-island trips were made in outrigger canoes,
popao, which are the only one of the original vessels
[178] to have remained up to the present day. However,
with the introduction of modern boats, the *popao*
have been somewhat modified in style and are used
today mainly in the outer islands of Tonga only for
fishing or traveling short distances.

[p. 5-B]

A [See category 343, p. 4--Analyst]

396
142
291
505

A life in harmony with the sea demands the mastery of boat-related skills. This young seaman named Mataele repairs a boat in Ha'ano, an island in Ha'apai which still depends mainly on small boat transportation for communication with the rest of Tonga and with the world.

'Oku mahu'inga foki 'i he mo'ui ki tahi 'a e poto 'i he ngaahi me'a fekau'aki mo e folau. Ko e ki'i talavou eni ko Mataele 'oku ne monomono ha vaka 'i Ha'ano, 'a e motu koia 'i he 'otu Ha'apai.

[p. 5-C]

39: Gerstle & Raitt C,Q-4,5 (1952-1972) 1974 OU9 Tonga OU9

54: Cook G,T-5 (1777) 1967 OU9 Tonga OU9

till it is the length they intend it. The hollowed side of the log of wood is to receive the ends of the unworked cloth, so that they may be out of the way of the work women. They have of this cloth of different degrees of f[i]neness, according to the bark on which it is made; the finest is made of the Chinese paper Mulberry tree.[1] The Courser sort of which they make very large piec[e]s does not receive the impression of any platen, but is made on the log only.[2] Of the finer sort, they have some that is striped, chequered and other patterns of different colours, but how these Colours are laid on I can not say as I never saw any of this sort made.[3] All these sorts will resist water for some time and that which has the strongest glaze will resist it the longest.

The next considerable Manufacture is matting in which they exceed all the places I have been at both in texture and beauty. Many of those which are made of the bark of the Poerou[4] so far exceed those they have at Otaheite, that they are not a bad article to carry their by way of trade. They also excell in making baskets, some are exceedingly neat and they have of them of many different patterns. It is almost needless to say that they make ropes and lines of all sorts, Nets for fishing, fish-hooks and all manner of fishing geer with the greatest facility. But in what I think they most excell in point of workmanship, is in the building their Canoes, for an account of which and the manner of Navigating them I refer to the narrative of my last voyage.[5]

Masonry Masonry I have seen none but in the walls that inclose their Morais and their is nothing extraordinary in them but the size of the Stones, some of which are ten or twelve feet in length, four or five in breadth and one or more in thickness.[6] I examined several of these stones and found them composed of Coral sand and small Marine shells, and therefore concluded that they had been hewn from of the surface of the coral rocks. But even to do this with thier tools is no little work for before they got Iron they had only adze[s] of stone, a chissel of bone; a coral stone and sand and the Skin

[1] *Broussonetia papyrifera*, Tahitian Aute, Tongan Hiapo. The dyed cloth thus described is properly called *ngatu*, not *tapa* as in the other islands.

[2] It was made from the bark of the young breadfruit tree, Mei (Tahitian Uru). This plain cloth the Tongans called *tapa*; it was, says Mariner (II, p. 206), 'seldom worn, but is chiefly used for various purposes at funerals'.

[3] With a small stick used as a brush, as is still done.

[4] This was the Tahitian name, Purau, for the common *Hibiscus tiliaceus*. The Tongan name was Fau.

[5] II, pp. 269–5, 447–8.

[6] Cook's misuse of the word 'morai' (*mala'e*) has already been noted. The reader interested in the remarkable structure of *fa'itoka* and *langi* can do no better than refer to the extended account in McKern's *Archaeology of Tonga*, pp. 30 ff.

55: Anderson D,T-5 (1777) 1967 OU9 Tonga OU9

suffer'd to shoot into a trunk, and the coarser sort which they sleep upon from a plant call'd E'varra.[1] There are many other articles of less note that employ their spare time, as combs of which they make vast numbers, little baskets made of the same substance as the matts and others of the fibrous Cocoa nut husk, either plain or interwoven with small beads, but all made with such neatness and taste in the disposition of the different varietys, which are very numerous, that a stranger cannot help looking with pleasure at their assiduity and dexterity. Every person knows the beautifull character that Solomon has drawn of an industrious women and the happy consequences that attend it, and we may almost venture to say that Solomon in that character has included a true picture of all the women of Tonga. The province alloted to the men is as might be expected far more laborious and extensive than that of the women. Agriculture, Architecture, Boat building, Fishing and other things that relate to Navigation are the objects of their care. I would not wish to refer to any thing prior to the date of this voyage to illustrate any circumstance by, when I can avoid it, as it would be interweaving subjects that ought to be seperate unless every person knew them as well as myself, but I cannot help relating here an observation which may have been made before, though not to my knowledge, which is that in all the places I have visited in these seas the degree of civilization that has taken place amongst them may be known by the attention they pay to the fair sex. Those in a very barbarous state treat their women with such a degree of rudeness or rather brutality and at the same time indifference that they seem to think them not so much intended as a companion, or to be upon the same scale with themselves, as a set of beings every way inferior to them and only fit for such mean offices as they would not stoop to. On the contrary as civilization has advanc'd we find them not only eas'd of those laborious employments which their natural delicacy of frame requires, but treated with that respect to which they are often more justly entitled than their lordly masters, and have even a great sway in the management of affairs. Cultivated roots and fruits being their principal support requires their constant attention to Agriculture, which they pursue very diligently and seem to have brought to as much perfection almost as circumstances will admitt of. The land about Mooa though so well planted is scarcely equal to that part of the island where Cap[t] Cook anchor'd in 1773, and from Mooa to the NE point which is all the places we have seen it is tolerable, from whence one might suppose, if the unseen parts are in the same proportion, that two thirds

[1] *fala* was the word for sleeping-mat, not for a plant. The pandanus was called *fa*.

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Fyatockas have their sides made close in the same manner but are perpendicular, & a few of the best belonging to the principal people are also done in that way with some open spaces at different parts to get in by. The only probable reason I can assign for their negligence in Architecture is their fondness of living much in the open air, in so much that they seem to consider their houses as of little use but to sleep in and retire to in bad weather; and the lower sort of people who spend a great part of their time in attending the others, being almost constantly in their houses, can have no use for them but in the last case.

They make amends for the former defect, if it can be truly reckon'd one, by their attention to and great dexterity in Naval Architecture, if I may be allow'd to give it that name. Their Canoes are of two sorts, one of them us'd chiefly to fish in or go to any small distance, the other to Navigate from isle to isle. The first are by far the most numerous[1] and are commonly about five and twenty feet long, near two over at the broadest part, and scarcely so deep. The Bow is exactly like a wedge, from whence it turns gradually broader towards the middle and tapers away till the after part, which droops lower than the fore ends not unlike the tail of a fish. There is a deck runs from forward to near a third of its length aft and another from abaft forward but somewhat shorter. They are built of a tree call'd Toee,[2] the wood of which is variously colour'd and the pieces or planks are so numerous, I know not whether from necessity or design, that I have counted twenty six in one of a common size on one side. Each plank is fitted with such nicety that they would do credit to an expert Europæan artist, the only joining to be seen on the outside being a line not more open than some in our common Cabinet work; But on the inside there is a small ridge on the edge of each plank, through which & the one next it holes are made by which they are lash'd firmly with cord. The side of the Boat is rounded and every part of the outside neatly polish'd, with little knobs on the two decks where they fasten small white shells as ornaments. They carry from three to five or even six people and are row'd with paddles of about four feet long with an oval, pointed blade which sets them along at a very quick rate. Their narrowness obliges them to use an outrigger or they would be constantly oversetting. This is made by placing a pretty thick spar about three feet from the boats side parallel to it, which is fixt to two others that are laid across the boat from the opposite side,

[1] This was the *tafa'anga*, 'among the most elegant of Pacific outriggers', says James Hornell, *Canoes of Oceania*, I (Honolulu, 1936), p. 259.
[2] Toi, *Alphitonia zizyphoides*.

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rains hard in the day they are guided by the swell of the sea & wind. 484
As another proof of the distance or at least of the stay they make at [502]
some places, they always carry a considerable quantity of Cloath, [821]
matts &c and provisions, the last of which they dress on a sort of [252]
hearth made of sand & stones plac'd near the fore part of the stage.
The number of people, amongst which are always several women, 505
being at least four times more than is sufficient to Navigate the Boat 461
implys some other business, though perhaps it may be for the relief of 533
each other: for here as in all other cases there seems to be such a
perfect unity amongst them that when they are oblig'd to paddle
from a calm or any other accident, the whole crew and rowers them-
selves join in songs and a musical recitative to give an agreement to
their strokes and ease the irksomness of that unvaried labour.

The only tools they have to make these boats are Hatchets, or 412
rather thick Adzes, of the smooth black stone mentioned before (but 321
some want the projecting part behind), an augur made of a sharks 237
tooth fix'd on a small handle, and a rasp of a rough fishes skin laid
over & fastend on a flat piece of wood thinner on one side with a
handle. The vast labour they must be at and the time that is spent 396
with their [boats], being perhaps their most perfect mechanical 348
production, are probably the reasons for being so carefull of them,
for they are built and preserv'd under long shades of two sides which
reach to the ground & incline towards the top, so that the ends which
are both open represent a half ellipsis on its base; but when that
cannot be done they always cover the deck'd part with Cocoa leaves
after they are haul'd on shore to prevent the sun hurting them.

The same tools are all they have for other works, if we except 412
different shells which they use as knives, but there are few that [237]
require these unless it is some of their weapons, the other articles
being chiefly their fishing materials, cordage and a few others. The
Cordage is made from the fibres of the Cocoa nut husk, which though 283
not more than nine or ten inches long they plait about the size of a 824
quill or less to any length they please, & roll it up in balls from which
the larger rop[e]s are made by many of these being tied together and
twisted. The lines they fish with are made from the [1]226
and are as strong and even as the best cord we make, resembling it [283]
almost in every respect. Their other things for that purpose are large
and small hooks, made with a pretty straight back and a point fix'd
on the inside near the end. The last are made entirely of pearl shell, [321]
but the first only coverd on the back with it, & the points of both
commonly of tortoise shell, those of the small being plain the others [391]

[1] Tou, not the *Malachia* but *Pipturus argenteus*, widely used for this purpose in the Pacific.

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Family MENISPERMACEAE

137

Genus **Stephania** Loureiro

Stephania forsteri (de Candolle) A. Gray, U.S. Expl. Exped., Bot. 1: 36, 1854.

Soft-wooded, twining, glabrous vine. Leaves alternate, round-ovate, bluntly pointed, the base rounded to retuse, peltate, up to 12 cm. or more long and 10 cm. wide, the petiole slender, nearly as long as the blade, attached 2-3 cm. from the margin of the blade. Flowers greenish, dioecious, in compound umbellate clusters; the fruit about 6 mm. in diameter, flattened and slightly laterally concave, red.

Tongatapu: *U.S. Expl. Exped.*

'Eua: in thicket near the center of the island, Mar. 28, 1953, *Yuncker 15544.*

Nomuka: in thicket along the road encircling the island between the sea and the central lake, Apr. 30, 1953, *Yuncker 15823.*

Vava'u: *Harvey; Crosby;* in thicket along the road near Houma village, May 22, 1953, *Yuncker 16115.*

Frequent in thickets throughout Tonga. Malaya to Polynesia.

S. hernandiaefolia Walp. in Hemsley's and Burkill's lists.

Family ANNONACEAE

Genus **Cananga** Hooker f. and Thomson

Cananga odorata (Lamarck) Hooker f. and Thomson, Fl. India 1: 130, 1855.

Tree, up to 15 m. or more tall. Leaves alternate, elliptic-oblong, acute, base rounded, obtuse, entire, up to 20 cm. or more long and 7 cm. wide, pubescent, pinnately nerved, petiole mostly less than 2 cm. long. Flowers greenish yellow, drooping, pubescent, very fragrant, the petals linear-lanceolate, up to 8 cm. or more long, on long, puberulent pedicels, in axillary, pedunculate, umbellate clusters; fruit oblong, fleshy, black, seeds numerous.

Tongatapu: *Graeffe; Moseley;* in Navutoka village, Feb. 27, 1953, *Yuncker 15086;* in Ma'ofanga village, Nov. 23, 1951, *Hürlimann 312.*

'Eua: in Pangai village, Apr. 7, 1953, *Yuncker 15658.*

Vava'u: *Crosby.*

Introduced and cultivated in villages throughout Tonga. A southern Asiatic plant now widely cultivated in tropical countries.

Tongan name: *mohokoi.*

The wood is used for canoe outriggers; the leaves and bark in medicines; and the flowers for ornaments, in leis, and for scenting oil.

396
278
247
303
824

Genus **Polyalthia** Blume

Polyalthia amicorum A. C. Smith, sp. nov. (fig. 9).

Arbor ad 5 m. alta trunco circiter 45 cm. diametro partibus novellis pilis fuscis 0.1-0.3 mm. longis exceptis glabra; ramulis gracilibus apices versus haud 1 mm. diametro teretibus

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The flowers and the fruit are used for leis and ornamentation, and the wood for general construction purposes. [1]

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301
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824

Hernandia ovigera Linnaeus, in Stickman, Herb. Amb., 14, 1754.

Medium to large tree, up to 20 m. or more tall. Leaves alternate, ovate, acute, peltate near base, entire, up to 20 cm. long and nearly as wide, five- to nine-nerved from petiole, petiole up to about as long as blade. Flowers monoecious, white, numerous in long-stalked, axillary and terminal, cymose clusters; fruit dry, somewhat ribbed, enclosed in an enlarged, fleshy, white or reddish, balloonlike vesicle with circumscissile opening.

Tongatapu: *Home.*

'Eua: in forest on seaward terrace near Lokupo, Mar. 27, 1953, *Yuncker 15533.*

Lifuka: in seaside thicket north of Pangai village, Apr. 24, 1953, *Yuncker 15711.*

Vava'u: *Crosby.*

Niuatoputapu: between Hihifo and Vaipoa, Dec. 7, 1951. *Hürlimann 373.*

Grows throughout Tonga, usually near the sea. From Indo-Malaysia to Polynesia.

H. peltata Meisn. in Hemsley's and Burkill's lists.

Tongan names: *fotulona, puko.*

The trunks are used for dugout canoes and the timber for banana shooks and general building purposes.

396
313
415
824

Family CAPPARIDACEAE

Genus **Crataeva** Linnaeus

Crataeva religiosa Forster f., Pl. Esculent., 45, 1786.

Small tree. Leaves alternate, three-foliate, leaflets elliptic or elliptic-obovate, sharply acuminate, base wedge-shaped, entire, up to 15 cm. or more long and 7 cm. wide, thin, petiolules less than 1 cm. long, petiole up to 12 cm. or more long. Flowers four-parted, clustered toward ends of branches on slender pedicels up to 4 cm. long, petals spatulate, creamy white, spreading to about 5 cm. in width, gynophore slender, up to 4 or 5 cm. long.

Tongatapu: in clay soil in thicket near Bay of Mu'a by Pelehake, Aug. 10, 1953, *W. T. Ha'angana* [*Yuncker 16282*]. This is the only specimen known in Tonga, and presumably was introduced.

From India to the Philippines and into Polynesia.

Genus **Capparis** Linnaeus

Capparis sandwichiana de Candolle, in DC. Prodr. 1: 245, 1824.

More or less prostrate, straggling or trailing shrub. Leaves alternate, oval or rounded, obtuse, base cordulate, entire, up to 4 cm. or more long, pinnately nerved, petiole slender, up to 4 cm. or more long. Flowers irregular, about 5 cm. wide, at first white, turning pink as they age, solitary, axillary, stamens numerous, ovary exserted on a long gynophore; fruit green, berrylike, ellipsoidal, about 5 cm. long, ridged, many-seeded, peduncle curved.

1 /Hernandia moerenhoutiana --Analyst/

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137 **Erythrina variegata** Linnaeus var. **orientalis** (Linnaeus) Merrill, Interpret. Herb. Amboin., 276, 1917.

Small to medium-sized, more or less spiny tree. Leaves alternate, trifoliate, long-petiolate, leaflets broadly triangular-ovate or rhombic, acute to acuminate, base truncate or acutish, up to 15 cm. long and nearly as wide, lower leaflets somewhat oblique, with prominent glands below base of petiolules. Flowers bright red, numerous, in dense, racemose clusters; pod up to 25 cm. or more long, seeds dark red.

Tongatapu: *U.S. Expl. Exped.;* in fence row near village of Niutoua, Mar. 2, *Yuncker 15115.*

'Eua: *Lister;* roadside near center of island, Mar. 19, 1953, *Yuncker 15364.*

Vava'u: in thicket near Houma village, May 22, 1953, *Yuncker 16136.*

Tafahi: near road between township of Tafahi and landing place Faihavanui, Dec. 15, 1951, *Hürlimann 543.*

Frequent throughout Tonga, often planted for use as living fence posts. India to Polynesia.

Tongan name: *ngatae.*

[396] [313] [415] [824] The trunks are used for making canoes, for general building purposes, and for banana shooks and the like.

Genus **Strongylodon** Vogel

Strongylodon lucidus (Forster f.) Seemann, Fl. Vit., 61, 1865.

Rather coarse, climbing, woody vine. Leaves alternate, three-foliate, leaflets glabrous, oval-ovate, entire, acuminate, base obtuse, three-nerved from base, midrib branched upward, lateral leaflets somewhat oblique, up to 10 cm. long and 6 cm. wide. Flowers red, beaked; pods flattened, thick, smooth, 10 cm. long and 5 cm. wide, seeds one or two, round, black.

'Eua: in southern part of eastern ridge near summit above Vaingana, Nov. 13, 1951, *Hürlimann 269.*

Infrequent. From Ceylon to the Hawaiian Islands.

Genus **Mucuna** Adanson

Mucuna gigantea (Willdenow) de Candolle, in DC. Prodr. 2: 405, 1825.

Rather slender, high-climbing, glabrous vine. Leaves alternate, three-foliate, long-petiolate, leaflets oval-ovate, lower two obliquely inequilateral, acuminate, base truncate or cordulate, up to 15 cm. or more long and 10 cm. wide, three-nerved from base, midrib branched upward, turning black upon drying. Flowers greenish, about 4 cm. long, long-pedicellate, in long-pedunculate, axillary, paniculate clusters; pods oblong, flattened, margin two-winged, covered with stinging hairs, up to 15 cm. or more long, seeds large, flattened, round or almost square.

Tongatapu: in forest tree along road between Lavengatonga village and sea, Mar. 6, 1953, *Yuncker 15187.*

'Eua: *Lister.*

Nomuka: in thicket near sea along road encircling island, Apr. 30, 1953. *Yuncker 15804.*

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nerved, with numerous fine, anastomosing nervules, petiolules up to 2.5 cm. long, petiole 5-7 cm. or more long. Flowers small, greenish orange, in branching, terminal clusters; fruit ovoid, drupaceous, 2 cm. or more long, seed edible. 137

'Eua: *Lister;* in thinly forested area back of Pangai village, on way to Fuai, Mar. 25, 1953, *Yuncker 15487;* in forest on eastern ridge above Fuai, alt. 150 m., Nov. 9, 1951, *Hürlimann 193.*

Vava'u: *Harvey; Crosby;* in forest at upper rim of coastal cliff along northwest coast, May 25, 1953, *Yuncker 16181.*

Occasional. Also known on Niue Island.

Tongan name: *'ai.*

Canarium samoense Engler, in DC. Monogr. Phanerog. 4: 134, 1883.

Large tree, up to 14 m. or more tall, bark and wood somewhat fragrant. Leaves alternate, pinnate, leaflets elliptic-lanceolate, acuminate, base acute, margin minutely uneven, pinnately nerved.

Kao: on steep rocky slope in open forest, about 180 m. alt., Apr. 30, 1953, *Yuncker 15966.*

This specimen is sterile and the report, which is new for Tonga, should be considered provisional. Also in Samoa.

Tongan name: *makai.*

The timber is used for canoe construction and in general building; the fragrant parts, for scenting oil. [396] [313] [303] [824]

Genus **Garuga** Roxburgh

Garuga floribunda Decaisne, Mus. Hist. Nat. Paris, Nouv. Ann. 3: 477, 1834.

Tree, up to 8 or 10 m. or more tall. Leaves alternate, hairy, pinnate, leaflets elliptic- or ovate-lanceolate, acuminate, base rounded, somewhat inequilaterally oblique, crenate-serrate, up to 13 cm. or more long and 5 cm. wide, pinnately nerved, petiolules scarcely 5 mm. long, petioles up to 8 cm. or more long. Flowers small, numerous, in paniculate clusters up to 15 cm. or more long, inflorescence parts puberulent; fruit 1 cm. or more thick.

Tongatapu: forest margin, below Niutoua village, Mar. 2, 1953, *Yuncker 15114;* near Nuku'alofa, 1926, *Setchell and Parks 15313.*

'Eua: clearing near Ohonua village, Apr. 2, 1953, *Yuncker 15634.*

Lifuka: near dwelling, Pangai village, Apr. 28, 1953, *Yuncker 15794.*

Vava'u: *Crosby 291;* in open forest near eastern coast below Houma village, May 22, 1953, *Yuncker 16129.*

Occasional throughout Tonga. Widespread from the Philippines and Java to Samoa, but not recorded from Fiji. Lam (Jard. Bot. Buitenzorg, Bull. III, 12: 329, 1932) indicates that *G. pacifica* Burkill (Linn. Soc. Bot., Jour. 35: 30, 1901) is to be reduced to the widespread *G. floribunda.*

Tongan name: *manaui.*

The timber is used in general construction work. [313] [824]

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Tongan name: *mo'ota.*

137 278 757 396 415 313 824

The plant parts when crushed have a somewhat disagreeable odor said to resemble that of fruit bats (flying foxes). The leaves are used medicinally and an extract of the leaves is used for wetting tapas to cover the body "in cases of weakness." The wood is used in making canoes and banana shooks and for general building purposes.

Dysoxylum tongense A. C. Smith, U.S. Nat. Herb., Contrib. 30: 509, 1952.

Large tree, up to 10 m. or more tall, branchlets stout and with large, rounded leaf scars. Leaves even-pinnate, up to 25 cm. or more long, leaflets elliptic-ovate, acute, base obliquely inequilateral, up to 15 cm. long and 8 cm. wide, glabrous, pinnately nerved, petiolules about 1 cm. long. Flowers small, sessile, in axillary, paniculate clusters up to 12-14 cm. long, parts of inflorescence puberulent, corolla greenish white.

'Eua: *Parks;* in forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15316;* edge of forest near center of island, Mar. 18, 1953, *Yuncker 15336;* Mar. 19, 1953, *Yuncker 15366;* Apr. 7, 1953, *Yuncker 15662.*

So far as I know, this species is restricted to 'Eua Island above about 100 m. altitude.

Tongan name: *mo'ota kula.*

313 322 824

The wood is used in handicraft work.

Genus **Aglaia** Loureiro

Aglaia heterotricha A. C. Smith, U.S. Nat. Herb., Contrib. 30: 486, 1952.

Tree with slender branches, branchlets, petioles, and lower leaflet surface scaly-hairy. Leaves odd-pinnate, leaflets seven, elliptic, up to 25 cm. long and 10 cm. wide, obtuse, base obtuse or acute, petiolules up to 17 mm. or more long, petiole 15-20 cm. long, conspicuously swollen at base. Flowers about 2 mm. long, on slender, short pedicels, in freely branched, axillary, paniculate clusters, the stamen filaments united into a pilose tube.

'Eua: central plateau, June or July 1926, *Parks 16305,* type collection. Known only from 'Eua.

Aglaia saltatorum A. C. Smith, U.S. Nat. Herb., Contrib. 30: 483, 1952.

Shrub or tree, up to 10 m. tall, twigs and young parts pubescent, hairs brown, stellate. Leaves odd-pinnate, leaflets mostly seven, essentially opposite, elliptic or oblong-elliptic, apex acute or rounded, base inequilateral, obtuse or acute, up to 15 cm. long and 8 cm. wide, pinnately nerved. Flowers small, about 2 mm. long, numerous, in rather large, axillary, paniculate clusters; fruit subglobose or ellipsoidal, about 2 cm. long, brown, stellately pubescent.

Tongatapu: *Setchell and Parks; McKern;* in seaside forest below village of Niutoua, Mar. 2, 1953, *Yuncker 15138.*

'Eua: in rich forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15313.*

Nomuka: above village in clearing near sea, Apr. 30, 1953, *Yuncker 15857.*

Lifuka: along road north of Pangai village, Apr. 25, 1953, *Yuncker 15738.*

Vava'u: *Crosby.*

Niuatoputapu: on coral soil near dwelling, Jan. 2, 1952, *Hürlimann 649.*

1 /Dysoxylum forsteri -- Analyst/

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Tongatapu: *Forster; U.S. Expl. Exped.;* in forest near Nualei, south of Nuku'alofa, Mar. 9, 1953, *Yuncker 15244;* near house, Ma'ofanga, Nov. 23, 1951. *Hürlimann 311.* 137

'Eua: *Lister;* in Ohonua village, Apr. 2, 1953, *Yuncker 15636.*

Of early introduction. Malaysia to Polynesia.

Tongan name: *vi.*

The timber[1] is used for general building purposes, and large trunks are used for dugout canoes. [824] [396] [313]

Genus **Pleiogynium** Engler

Pleiogynium solanderi (Bentham) Engler. in DC. Monogr. Phanerog. 4: 255, 1883.

Medium to large tree up to 10 m. or more tall. Leaves alternate, odd-pinnate, leaflets seven to nine, obliquely elliptic or elliptic-ovate, acuminate, base acute and narrowly decurrent on petiolules, up to 10 cm. or more long, pinnately nerved, petiolules mostly scarcely 1 cm. long. Flowers small, densely clustered on rather short, axillary clusters; fruit turbinate, about 2.5 cm. in diameter, broadly grooved.

'Eua: margin of forest near center of island, Mar. 18, 1953, *Yuncker 15332;* in seaward forest on terrace above Houma village, Mar. 26, 1953, *Yuncker 15507.*

Vava'u: *Crosby;* on seaward face of coastal cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16114.*

Occasional. From tropical Australia to Polynesia.

Tongan name: *tangato.*

An excellent timber tree. [824] [313]

Genus **Rhus** Linnaeus

Rhus taitensis Guillemin, Ann. Sci. Nat. Bot. II, 7: 361, 1837.

Medium to large forest tree with young parts more or less puberulent. Leaves large, alternate, odd-pinnate, leaflets up to 19 or more, oblong, bluntly pointed, base obliquely inequilateral, up to 10 cm. or more long, short-petiolulate. Flowers small, white, numerous, in large, terminal, compound clusters 30 cm. or more long.

Tongatapu: *U.S. Expl. Exped.;* open forest near Vaini village, Feb. 26, 1953, *Yuncker 15066;* forest, terrace below Fu'amotu, Nov. 3, 1951, *Hürlimann 139.*

'Eua: *Lister;* open forest near center of island, Mar. 19, 1953, *Yuncker 15365.*

Lifuka: clearing near center of island, infrequent, Apr. 27, 1953, *Yuncker 15773.*

Kao: lower margin of slope forest, May 6, 1953, *Yuncker 15972.*

Vava'u: *Crosby.*

[1] /Spondias dulcis -- Analyst/

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Genus **Alphitonia** Reissek

137 **Alphitonia zizyphoides** (Solander) A. Gray, U.S. Expl. Exped., Bot. 1: 278, pl. 22, 1854.

Medium to large tree with young branches brown-tomentose. Leaves alternate, elliptic-lanceolate, acute, base rounded, obtuse or acutish, up to 15 cm. or more long and 5 cm. wide, pinnately nerved, nerves prominent, bright green above, whitened-tomentose beneath, petioles 1-2 cm. long. Flowers small, whitish, numerous, in branching, axillary, and terminal, cymose clusters; fruit about 5 mm. in diameter, purplish.

Tongatapu: *U.S. Expl. Exped.; Home;* forest near sea, vicinity of Niutoua village, Mar. 2, 1953, *Yuncker 15121.*

'Eua: *Lister;* summit of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 199;* open forest near center of island, Mar. 19, 1953, *Yuncker 15360.*

Nomuka: clearing along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15819.*

Lifuka: roadside, between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15784.*

Kao: lower margin of slope forest, May 6, 1953, *Yuncker 15962.*

Vava'u: *Crosby;* upper slope of Talau, west of Neiafu, May 24, 1953, *Yuncker 16153.*

Tafahi: along road from township of Tafahi toward Taihavanui, Dec. 15, 1951, *Hürlimann 567.*

Frequent throughout Tonga. From Sumatra and the Philippines eastward to Polynesia.

A. excelsa Reiss. in Hemsley's and Burkill's lists.

Tongan name: *toi.*

[824 313 396 278 515] This tree provides an excellent grade of timber useful in construction work and for dugout canoes, poi pounders, banana shooks, and the like. The bark is used in preparing medicines, and the leaves may be used as a soap substitute.

Family ELAEOCARPACEAE

Genus **Elaeocarpus** Linnaeus

Elaeocarpus tonganus Burkill, Linn. Soc. Bot., Jour. 35: 29, 1901.

Medium-sized tree up to 10 m. or more tall. Leaves alternate, elliptic or elliptic-ovate, acuminate, base acutish or obtuse, crenulate, up to 12 cm. or more long and 6 cm. wide, pinnately nerved, petiole slender, up to 4 or 5 cm. long. Flowers less than 1 cm. long, in simple, mostly axillary racemes up to 5 cm. or more long, pedicels up to 1.5 cm. long, inflorescence silky-hairy; fruit ellipsoidal, up to 1.5 cm. long.

'Eua: in forest near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15554* [a juvenile specimen, presumably this species].

Vava'u: *Crosby 15* [type]; edge of forest above Leimatua, May 20, 1953. *Yuncker 16055;* on steep slope leading to lagoon at Vaihoi, below Leimatua. May 26, 1953, *Yuncker 16183.*

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

Lifuka: in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15753;* on low cliff along eastern side of island, Apr. 21, 1953, *Yuncker 15771.* 137

Vava'u: *Crosby;* in seaside forest below Houma village, May 22, 1953, *Yuncker 16137.*

Tafahi: in forest between township of Tafahi and landing place, Tafe, Dec. 13, 1951, *Hürlimann 504.*

Frequent near shore throughout Tonga. A southern Asiatic species extending to the Philippines and Polynesia.

B. butonica Forst. in Hemsley's list and *B. speciosa* L. f. in Burkill's list.

Tongan name: *futu.*

The timber[1] is used for house construction, banana shooks, and so forth; the trunks, for dugout canoes; and the bark, as a fish poison. [824] [313] [342] [396] [226]

Family Rhizophoraceae

Genus **Rhizophora** Linnaeus

Rhizophora mangle Linnaeus, Sp. Pl., 443, 1753.

Round-topped, much-branched tree, sometimes up to 10 m. tall, bearing many, pendent, aerial roots which form an impenetrable entanglement. Leaves opposite, elliptic or obovate-elliptic, apex blunt and often slightly notched, base acute and decurrent on petiole, up to 10-12 cm. long and 6-7 cm. wide, somewhat leathery, pinnately nerved, midrib stout, lateral nerves slender. Flowers few, four-parted, about 2 cm. wide, yellow, in simple, axillary, cymose clusters, seed usually germinating while on tree, producing a radicle up to 30 cm. long.

Tongatapu: forming a grove on the tidal flat at Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15023;* May 30, 1953, *Yuncker 16206.*

Nomuka: along shore of large central lake, Apr. 30, 1953, *Yuncker 15847.*

Vava'u: along shore below Houma village, May 22, 1953, *Yuncker 16130;* along shore of lagoon, Vaihoi, near Leimatua village, May 26, 1953, *Yuncker 16185.*

Occasional throughout Tonga. Tropical America and westward to Fiji, Samoa, and Tonga, where it seems to meet but remain distinct from the following species.

Tongan name: *tongolei.*

The timber is durable and used in a variety of ways; the roots are used in house construction; the sap, for dyeing. [824] [313] [342] [386]

Rhizophora mucronata Lamarck, Encycl. Méth. 6: 189, 1804.

This species closely resembles the preceding, differing chiefly in having sharply pointed leaves.

Vava'u: *Harvey; Crosby.*

Infrequent. A species of the Old World tropics extending into Polynesia.

1 /Barringtonia asiatica -- Analyst/

76: Yuncker N-4,5 (1953) - 1959 OU9 Tonga OU9

Genus **Bruguiera** Lamarck

137 **Bruguiera conjugata** (Linnaeus) Merrill, Philippine Jour. Sci. 9C: 118, 1914.

Small tree similar in habit to *Rhizophora*, up to 4 m. or more tall. Leaves alternate, elliptic, acuminate, base decurrent along petiole, up to 12 cm. or more long and 4-5 cm. wide, coriaceous, somewhat glossy, finely pinnately nerved, petiole up to 4 cm. or more long. Flowers greenish yellow, solitary, axillary, about 3 cm. long, calyx lobes very narrowly lanceolate, acute, usually 10, up to 1.5 cm. long; fruit included in calyx tube, seed germinating on tree and forming an elongated radicle.

Nomuka: along shore of central lake, Apr. 30, 1953, *Yuncker 15828*.

Vava'u: *Crosby*.

Occasional near shore but less frequent than *Rhizophora*. From tropical Asia through Malaya to Polynesia.

B. rheedii Blume in Hemsley's list and *B. gymnorhiza* Lam. in Burkill's list.

Tongan names: *tongo, tongo ta'ane*.

824 313 386 The hard and durable wood is used in many ways, and an extract of the flowers furnishes a dye.

Family COMBRETACEAE

Genus **Terminalia** Linnaeus

Terminalia catappa Linnaeus, Mantissa 1: 128, 1767.

Medium to large tree with whorled, horizontal branches. Leaves clustered toward ends of branches, obovate, obtuse or abruptly acute, base narrowing, narrowly and abruptly obtuse at petiole, entire, up to 25 cm. or more long and 15 cm. wide, pinnately nerved, petioles short and stout. Flowers small, greenish white, in axillary, spikelike clusters near ends of branches; fruit oval, flattened, two-edged, greenish to red, up to about 5 cm. long, flesh thin and edible.

Tongatapu: *U.S. Expl. Exped.*; in open forest near Nualei, Mar. 9, 1953, *Yuncker 15246*; in seaside thicket below Ha'akame village, Mar. 12, 1953, *Yuncker 15286*.

'Eua: in seaward forest on terrace above Houma village, Mar. 26, 1953, *Yuncker 15506*.

Lifuka: roadside near north end of island, Apr. 25, 1953, *Yuncker 15752*.

Tafahi: shore, northeast coast north of Fakafafa moe Tauloto, Dec. 17, 1951, *Hürlimann 601*.

Niuatoputapu: forest on plain southeast of Falehau, alt. 5 m., Dec. 7, 1951, *Hürlimann 385*.

Frequent throughout Tonga, commonly near the shore. From tropical Asia eastward to Polynesia; naturalized in America.

Tongan name: *telie*.

824 313 396 278 262 The timber is used for construction purposes, canoes, banana shooks, and so forth; the leaves, for medicine; and the fruit, as food.

77: Whitcombe Y-3 (no date) 1930 OU9 Tonga OU9

342 *kaho* sticks are placed in position around the sides of the house and bound with *kafa*, to form a siding which is called *lu kaho*.

The door (*mataba*) of a Tongan house is made from coconut leaves plaited and tied together, and is arranged to pull up and down [352] (*bola*). The floor is made by leveling the earth on which the house stands and covering it first with dry coconut leaves, then with very [285] young coconut leaves plaited into mats. These mats are dried in the sun a few days before being used.

342 343 There are three types of Tongan houses: the dwelling house (*fale nofoaga*); the store house in which all food is kept (*fale falcoko*), and the kitchen or cooking house (*fale beito*).

BUILDING THE CANOE

396 The Tongans make their canoes from any one of several trees: the *buko vili*, the *tavahi*, the *toi*, the *bibi*, the *gatae*, the *fotulona*, and the *vi*. A large tree of one of these species is cut down, shaped, and the center scooped out. The outrigger (*hama*) is then made from the wood of the *tou* tree, and the outrigger sticks from the wood of the *bibi* tree (*bibi fai lolo*). The joins are made from the *tutu uli*, and the *hama* bound with *kafa* which is made from coconut husk fiber. Finally, the paddles are made, a large coconut shell provided as a bailer, and the canoe is ready for the sea.

501 The ordinary canoe is termed *babao* and the seagoing canoe *kalia*.

NATIVE METHODS OF FISHING

226 Diving (*ukuuku*). The diver, equipped with a one-pronged spear, dives down beside the coral reefs and hunts for fish that may be hidden in the caves of the reef. Sometimes the native divers secure rock cod, sharks, and other fish nearly as large as themselves.

Fish traps (*ba ika*). These are built by placing sticks in a circle, fence-fashion, leaving a gate or door into the circle. To a long creeper (*valai*), used as a rope, are attached split coconut leaves to act as wings or guides. The fish get inside these guides and follow them into the trap. The fence is erected in the tide and inspected when the tide is low.

Turtle nets (*kupega fonu*). These are made from coconut string (*kafa*), and are placed in the center of passages in the reef to trap the fish.

505 /231 cont./

607. Both are sailboats with auxiliary motors and a displacement of approximately 80 to 100 tons.

[501] the motor boats and sailboats (with auxiliary motors) of the churches and especially all the sailboats (cutters, sloops) owned by Tongans and today stationed on almost all inhabited islands of the Archipelago. (608)

608. In 1952, for example, six such sailboats belonged to the village of Nomuka (567 inhabitants, ten to the village of 'Uiha (647 inhabitaznts) and two (along with two motor boats) to the village of Fungamisi (263 inhabitants). The price of such a sailboat depends on its size and the circumstances of its acquisition. Today it may cost up to 800 T. (about 7320 German marks).

[435]

[396] [177] [422] [471] These sailboats built entirely after European models are built by Whites or half-castes, sometimes also by Tongans themselves with imported material. They are the property of one person or of several who formed a sort of cooperative. For a fixed fare, paid in Tongan currency, the generally altogether overloaded vessels transport human beings and cargo; people travel on them to visit relatives or go shopping, students travel on them to their colleges at the beginning and end of vacation, copra is shipped on these sailboats to the receiving stations of the Copra Board, and the supply of goods from the commercial centers of Nuku'alofa, Neiafu and Pangai to the small and smallest islands is made possible only by this traffic; natives also set out to fish in the high seas (deep sea angling) in cutters and sloops.

[501] In such boats, which are approximately between 4 and 15 tons, the natives often sail a hundred and more sea miles on the open sea, and there are seldom accidents even during stormy night journeys. The Tongans(609)

/233 cont./

501 small sail (made of European cloth, seldom a mat) for which they put up a small mast. They use the popao to cover the distance between
501 505 islands lying close together, (615)

615. They seldom use the popao for greater distances, as did a Nomukan, for instance, who, in 1951, traveled 14 sea miles with it across the open sea.

for various methods of fishing (see above) and, on account of their slight draft, to board and leave the small sailboats lying at anchor, as well as to load and unload the latter.

396 824 The natives like to make the hull of the popao from the trunk of the breadfruit tree (Artocarpus altilis), but they also use the mango (Mangifera indica L.), the tavahi (Rhus taitensis Guillemin), the toi (Alphitonia zizyphoides [Spreng.] A Gray), the mohe-mohe and, if possible, the tamanu. Men who have particular experience in boat-building, but also those who are doing this work for the first time in their lives, cut the hull of the boat, which is about three to five meters long, out of /234/ one piece of trunk. They also like to
[438] [435] "export" roughly hewn hulls from islands were the aforementioned types of wood occur in greater abundance to islands that are poor in them; on Nomuka, for instance, they pay 10 £T. (breadfruit tree wood) to 15 £T. (tamanu wood) for such an unfinished boat imported from 'Eua.

396 [465] The owner of the boat-to-be may do the work himself, or a man experienced in boat-building who is provisioned or remunerated (who may receive, for examply, 2 £T. or a horse) does the work. Often the
[496] men work in twos or threes, with relatives (for example, son, father, son-in-law, father-in-law, cousin), friends or other villagers helping.
[462] Boat-building is purely men's work.

396 412 To hollow out the dugout, which has been roughly hewn with axes and transverse hatchets, they use especially the small transverse hatchet toki unga ko (with the gouge blade, see p. 200-202). They also

/234 cont./

396 412 use the quite effective toki hoka that consists of a handle about 1.60 meters long and with a larger gouge screwed to one end, with which the wood can be forcefully chipped off. The outer surface of [177] the hull is hewn with the transverse hatchet fale-vatu (see p. 200-202) until it shows the proper curvature and seems almost smoothly planed; if possible, however, they work with a European iron plane.

[284] [824] To attach the two outrigger poles (kiato) (616)

616. For example, from wood of the milo tree = Thespesia populnea (L.) Solander.

they drill holes with a European drill at two opposite points of the boat's side, enlarge the holes with a red-hot iron, place the outrigger poles (their ends notched with the small transverse hatchet) crosswise over the rims of the boat's side and lash them in this position with coconut fiber cords soaked in water, which are drawn through the bored and burned holes and are tightly and neatly wound and finally pounded firm with a small transverse hatchet (used as a hammer). Sometimes they also connect the two outrigger poles about 0.80 to 1 meter from the hull with a rod ('akau puke) (617)

617. Of milo-wood, for instance.

lashed to them, in order to achieve greater strength of the outriggers.

396 [824] The float (hama) (618)

618. For example, of mohokol wood = Cananga odorata (Lam.) Hook. f. and Thomson.

which has already been prepared, with ends tapering to a point, is then provided with four (or five to six) drilled holes (European drill) in the two sections where the outrigger poles are to be fastened; into the holes, trimmed and pointed struts (tuki-tuki) (619)

[824] 619. For example, of toa wood = Casuarina equisetifolia L.

/234 cont./

396 are pounded slantwise (with a chunk of wood or the back of a hatchet) so that they are joined over the two sections in such a way that the outrigger poles can be fastened to them with coconut cords.

[412] The protruding ends of the struts and the outrigger poles are then cut off with a machete or are sawed off with a handsaw. (621)

[501] 620. The measurements of a popao completed at the end of December 1951 on Nomuka were: hull: length 4.50 meters, height (center) 0.35 meters inner width 0.25 meters; outrigger poles: 1.83 meters long; connecting rod of the outrigger poles: 2.05 meters long; float: 3.22 meters long; struts: 0.38-0.47 meters long.

After a short trial run (with old paddles) the boat is anchored under water for a night, to make it firmer and tighter; then it is ready to be used.

Instead of struts they often merely pound small plugs into the float and fasten to them flexible pieces of wood obliquely to the float, on the /235/ upward-bent ends of which the outrigger poles are lashed. This method is used more in the northern then the southern part of the Archipelago.

[178] The present-day popao apparently still correspond to their ancient Tongan models in the use of materials and the construction. In order to make them more seaworthy, however, the natives sometimes also nail laths and boards to the walls and elevate the bow and stern with corresponding wooden attachments; the resulting seams are sealed with scraps of cotton or with imported cement. A leak is stopped up with tapa or cotton and a piece of tin or copper nailed over it, or only cement is used. Twine and wire sometimes replace the solid coconut-cord lashings. Some owners of such outrigger boats also paint them with oil paint (for example, blue) in order to make them more resistant to sea water.